We claim:

1. A calibration process for a detector comprising:

(a) selecting a drive signal from a plurality of drive signals;

(b) applying the drive signal to a lamp;

(c) recording a measurement signal resulting from ionization that arises from exposing a gas mixture to output from the lamp;

(d) repeating steps (a), (b), and (c) until the measurement signals for each of the drive signals have been recorded; and

(e) selecting from the plurality of drive signals, a first drive signal for normal operation of the detector, wherein the first drive signal corresponds to a desired mapping of measurement signal levels to concentrations of ionizable gases.

2. The process of claim 1, wherein the drive signals differ from each other in drive power provided to the lamp.

3. The process of claim 1, wherein each of the drive signals is an AC signal.

4. The process of claim 3, wherein the drive signals differ in voltage amplitude.

5. The process of claim 1, wherein each of the drive signals differ in resulting UV intensity in the output of the lamp.

6. The process of claim 1, further comprising selecting the desired mapping from among a set of mappings that map the recorded measurement signals to a gas concentration known to be in the gas mixture.

8. The process of claim 1, further comprising:

selecting a second drive signal from the plurality of drive signals;

using the first drive signal when measuring gas concentrations below a threshold level;

and

using the second drive signal when measuring gas concentrations above the threshold level.

9. The process of claim 8, further comprising switching from the first drive signal to the second drive signal in response to a measurement indicating a gas concentration above the threshold level.

10. The process of claim 9, wherein the switching occurs automatically in the detector when the measurement found using the first drive signal indicates that the gas concentration is above the threshold level.

11. The process of claim 8, further comprising switching from the second drive signal to the first drive signal in response to a measurement indicating a gas concentration below the threshold level.

12. A photo-ionization detector implementing the calibration process of claim 1.

13. A process for operating a detector comprising:

(a) generating a measurement signal from ionization that arises when exposing sample gas to output from a lamp operated at an initial level of a drive power;

(b) determining a concentration of ionizable gases using the measurement signal generated in step (a) and a mapping of measurement signal levels to concentrations of the ionizable gases;

(c) changing the drive power to a new level in response to a trigger event that indicates that intensity of the output of the lamp may have changed;

(d) generating the measurement signal from ionization that arises when exposing sample gas to the output from the lamp operated at the new level; and

(e) determining a concentration of the ionizable gases using the measurement signal

generated in step (d) and the mapping of measurement signal levels to concentrations of the ionizable gases.

14. The process of claim 13, wherein the trigger event comprises reaching an operating time of the detector since a last calibration.

15. The process of claim 14, further comprising using a change between a drive power that the last calibration selected and a drive power that a preceding calibration selected to select the operating time based.

16. The process of claim 14, further comprising using a change between a drive power that the last calibration selected and a drive power that a preceding calibration selected to select an amount of change in the drive power in step (c).

17. The process of claim 13, wherein the trigger event has parameters that are selected according to previous calibrations of the detector.

18. The process of claim 13, wherein the trigger event repeats after a fixed interval of time.

19. The process of claim 13, wherein the trigger event is a measurement of intensity of the lamp indicating that the intensity has fallen from a previous intensity level.

20. The process of claim 13, wherein the trigger event is a change in a zero baseline that corresponds to the measurement signal when the sample gas is free of the ionizable gases.

21. The process of claim 13, wherein step (c) comprises increasing the drive power to compensate for expected degradation of performance of the lamp.

22. The process of claim 13, repeating steps (c), (d), and (e) at intervals during operation of the detector.

23. The process of claim 22, wherein repeating steps (c), (d), and (e) occurs between consecutive calibrations of the detector.

24. The process of claim 23, wherein each calibration of the detector comprises:

(a1) selecting a coarse level from a plurality of coarse levels for the drive power;

(b1) applying the drive power at the selected coarse level to the lamp;

(c1) recording the measurement signal generated from ionization that arises from exposing a gas mixture to the output from the lamp at the selected coarse level;

(d1) repeating steps (a1), (b1), and (c1) until the measurement signal for each of the coarse levels have been recorded; and

(e1) setting the initial level of the drive power to the coarse level that corresponds to a desired mapping of measurement signal levels to concentrations of ionizable gases.

25. The process of claim 24, wherein changing the drive power in step (c) changes the drive power by less than a difference between the initial level and a next higher one of the coarse levels.

26. The process of claim 24, wherein repeating steps (c), (d), and (e) between the consecutive calibrations of the detector ends when an accumulation of changes in step (c) is equal to or greater than a difference between the initial level and a next higher one of the coarse levels.

27. A photo-ionization detector implementing the process of claim 13.

28. A process for operating a photo-ionization detector comprising:

(a) applying a first drive signal to a lamp;

(b) measuring ionization resulting from exposing a gas mixture to output from the lamp;

(c) determining whether the ionization measured indicates the gas mixture contains a concentration of ionizable gas that is above a threshold level; and

(d) in response to the concentration being above the threshold level, applying a second drive signal to the lamp and repeating steps (b) and (c).

29. The process of claim 28, further comprising switching between applying the first drive signal and applying the second drive signal based on measurements of the concentration.

30. The process of claim 28, wherein step (c) is performed using a first mapping of measurement signal level to concentration when the ionization measured resulted from exposing the gas mixture to the output of the lamp while the first drive signal is applied and is performed using a second mapping of measurement signal level to concentration when the ionization measured resulted from exposing the gas mixture to the output of the lamp while the second drive signal is applied.

31. The process of claim 28, further comprising changing the first drive signal and the second drive signal to provide new driver power levels in response to a trigger event that indicates that intensity of the output of the lamp may have changed.

32. A photo-ionization detector implementing the calibration process of claim 28.

33. A process for operating a photo-ionization detector comprising:

sensing whether a lamp in the detector is operating properly when a first drive signal is applied; and

in response to the lamp not operating properly, applying a second drive signal that provides more power to the lamp than does the first drive signal.

34. The process of claim 33, wherein sensing whether the lamp is operating properly

comprises sensing operation of a drive circuit for the lamp.

35. The process of claim 34, wherein sensing whether the lamp is operating properly comprises sensing light output from the lamp.

36. The process of claim 34, wherein sensing whether the lamp is operating properly comprises comparing a measurement signal when the first drive signal is applied to a measurement signal when a drive signal providing more power is applied to the lamp.